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IX.

NOTES ON COMPOSITÆ AND CHARACTERS OF CERTAIN GENERA AND SPECIES.

BY ASA GRAY.

Read, May 12, 1874.

THIS paper is a continuation and conclusion of one which was communicated to the Academy a year ago, and printed at the close of the preceding (the 8th) volume of the Proceedings. It chiefly concerns Californian genera, and the changes which it becomes necessary or proper to make on account of the new revision of the *Compositæ* by Mr. Bentham in the second volume of Bentham and Hooker's Genera Plantarum; and it indicates a few slight corrections in that admirable and arduous revision, as well as the somewhat different conclusions to which I have been led in respect to the circumscription of two or three genera.

Characters of a small number of new species of other orders are appended at the close.

MADIEÆ. A characteristically Californian subtribe, with one *Madia* dispersed to Chili, and two remarkable genera in the higher region of the Sandwich Islands. In the Genera Plantarum alternate leaves are assigned to all our North American genera; but the lower or lowest are commonly opposite, and all but the uppermost are prevailingly so in Nuttall's *Anisocarpus* and my *Hemizonella*. It was by an oversight, as the context shows, that the achenia of *Anisocarpus* were said to be obcompressed in the Flora of North America.

MADIA Molina. The reduction of *Madaria* DC. and *Madorella*, *Anisocarpus*, *Amida*, *Harpæcarpus*, and some other genera of Nuttall to *Madia*, the counterpart of what I had already done in *Layia*, is

freely to be accepted. The species may be most conveniently and naturally arranged under three subgenera, as below.*

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* MADIA Molina.

§ 1. MADARIA. (*Madaria* DC. & *Anisocarpus* Nutt.) Ligulæ conspicuæ, exsertæ, plurimæ: flores disci plurimi, aut omnes aut centrales steriles, corollis pubescentibus.

* Achenia seu ovaria disci pappo tenui fimbriato-paleolato vel plumoso superata. — *Anisocarpus* Nutt.

1. M. NUTTALLII Gray. Hirsuta, gracilis, 1–2-pedalis; foliis caulinis plerisque oppositis denticulis seu dentibus gracilibus sæpe instructis; capitulis mediocribus longe tenuiter pedunculatis; involucri squamis breviter apiculatis; ligulis majusculis; acheniis radii obovato-falcatis lateribus planis enerviis (ovariis) disci sterilibus, pappo brevi. — Proc. Am. Acad. 8, p. 391. *Anisocarpus madioides* Nutt.

2. M. BOLANDERI Gray, l. c. Villoso-hirsuta, 2–4-pedalis; foliis plerisque alternis, inferioribus elongatis; capitulis majoribus racemosis; involucri squamis (modo subsequentis) ultra partem fructiferam lineari-appendiculatis; paleis receptaculi linearibus distinctis; ligulis breviusculis; acheniis (etiam radii parce hirtellis) elongatis, radii lanceolato-falcatis faciebus 1–2-nervatis; disci exterioribus ut videtur fertilibus; pappo e paleolis setiformibus barbellato-plumosis inæqualibus corolla paullo breviore. — *Anisocarpus Bolanderi* Gray, Proc. Am. Acad. 7, p. 360. — The ray-akenes, in no. 499 of the distribution of Kellogg and Harford, also show a rudimentary pappus?

* * Achenia seu ovaria omnia calva. — *Madaria* DC.

3. M. ELEGANS Don, Bot. Reg. t. 1458. Spithamæa ad tripedalem; involucri squamis lineari-appendiculatis; ligulis (in majoribus 10–15, in depauperatis 5–9) elongatis aut luteis concoloribus aut basi atrorubris, lobulis angustis; receptaculo convexo hirto-fimbrillifero; ovariis disci inanibus; acheniis radii oblique obovatis, areola epigyna depressa. — *Madaria elegans* & *M. corymbosa* DC. The figure of *M. corymbosa* in Endlicher's Iconographia is from a dried specimen, with rays poorly developed.

4. M. RADIATA Kellogg, Proc. Calif. Acad. 4, p. 190. Bi–tripedalis, viscido-pubescens et glandulosa (nec hispida); involucri squamis breviter appendiculatis; ligulis 9–20 aureis lato-oblongis obtuse tridentatis; receptaculo plano subglabro; floribus exterioribus disci fertilibus; acheniis radii anguste obovato-falcatis rostello brevissimo recurvo apiculatis, disci rectiusculis subclavatis faciebus angulatis, areola epigyna depressa, centralibus inanibus. — Ligules half an inch long, abrupt at base, the expanded head, including these, sometimes two inches in diameter. A plant was raised in the Cambridge Botanic Garden, in 1873, but no good seed was saved.

§ 2. EUMADIA. (*Madia* & *Amida* Torr. & Gray. *Madia, Madariopsis, Madorella,* & *Amida* Nutt.) Ligulæ breves inconspicuæ, 12–1, quandoque nullæ: disci flores plurimi vel pauci, omnes fertiles; corollæ tubo pubescente: receptaculum planum, ambitu excepto nudum glabrum.

5. M. SATIVA Molina. — California is perhaps the birthplace of this species, to which must belong, as mere varieties, var. CONGESTA, *M. capitata* Nutt., the com-

HEMIZONELLA. *Hemizonia* § *Hemizonella* Gray, Proc. Am. Acad. 6, p. 548. Upon a review of the group, it seems proper that these little plants should constitute a genus. They differ from *Hemizonia* not only in the reduction of the disk-flowers to unity, but in the complete enclosure of the achenia in the involucral scale, after the manner of *Madia*, yet with a difference which answers to the different form of the achenium itself: their leaves also are mainly opposite, in which they are unlike both *Harpæcarpus* and *Hemizonia.* The species are as follows: —

HEMIZONELLA MINIMA. *Hemizonia* (*Hemizonella*) *minima* Gray, Proc. Am. Acad. 6, p. 548.

HEMIZONELLA PARVULA. *Hemizonia parvula* Gray, l. c.

HEMIZONELLA DURANDI. *Hemizonia Durandi* Gray, l. c.

HEMIZONIA DC. The only change by the Genera Plantarum is the incorporation of *Calycadenia,* which had become inevitable or nearly so. Some of the external disk-flowers not rarely perfect their achenia. To most of the species of *Hemizonia* the character "achenia lævia" is inapplicable. When the genus was worked up for the Flora of North America, several species were not well understood. All are annuals, or at most biennials. The subjoined summary of the arrangement adopted for the forthcoming Flora of California may be use-

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mon *Tarweed* of the eastern part of California; var. RACEMOSA, *Madorella racemosa* Nutt., the achenia of which are with or without nerve-angled sides; and var. DISSITIFLORA, *Madorella dissitiflora* Nutt., a depauperate or slender form, with fewer-flowered heads and shorter and broader achenia.

6. M. GLOMERATA Hook. Fl. Bor.-Am. *Amida gracilis* and *A. hirsuta* Nutt., forming one and a very distinct species of true *Madia,* having ray-flowers reduced to four, three, or even to one or none at all, the disk-flowers also very few. The akenes are straightish and somewhat fusiform, sometimes flattened and merely nerved, but at maturity those of the disk almost prismatic, having 4 or 5 acute angles. With no. 285 of Hall's Oregon collection some *M. sativa* was mixed in the distribution.

§ 3. HARPÆCARPUS. (*Harpæcarpus* Nutt.) Ligulæ brevissimæ 4–8: flos disci unicus intra cupulam 3–5-dentatam, fertilis: corollæ glabræ: achenia radii obovato-lunata, apiculata, disci rectum oblique obovatum. Capitula pusilla, pedunculo filiformi, involucri squamis apice vix appendiculatis.

M. FILIPES Gray, Proc. Am. Acad. 8, p. 391. *Sclerocarpus exiguus* Smith? *Harpæcarpus madarioides* Nutt.; Torr. & Gray, l. c. *H. exiguus* Gray, in Bot. Mex. Bound. p. 101. On a wider comparison of specimens, I conclude that we have only one species of this group. The size of the achenia and the prominence of their beak-like apiculation are variable.

ful.[*] The species fall under three very well-marked subgenera; — to which I am obliged to add a fourth for Kellogg's *Calycadenia plumosa*,

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[*] HEMIZONIA DC., Benth. & Hook. (*Hemizonia, Hartmannia,* & *Calycadenia* DC. *Hemizonia* & *Calycadenia* Torr. & Gray.)

§ 1. HARTMANNIA. (*Hartmannia* DC.) Achenia fertilia (radii) opaca, sæpe rugosa, valde gibbosa, areola epigyna parva ex angulo interno papilloso- vel rostellato- exserta. Flores flavi.

* Receptaculum planum, præter marginem cupulato-paleaceum nudum. Achenia radii demum rugosa; disci sterilia sæpius inania, pappo paleaceo vel squamellato rariusve nullo. (*Hartmannia* DC.)

+ Ligulæ 5, latæ, tubulo incrassato: fl. disci 5–6, pappo paleaceo donati. Capitula parva.

1. H. RAMOSISSIMA Benth. Bot. Sulph.

2. H. FASCICULATA Torr. & Gray, Fl. N. Am. *Hartmannia fasciculata* DC. Prodr. *H. glomerata* Nutt.

+ + Ligulæ 12–20, longiores, tubulo glanduloso gracili: achenia fertilia biseriata: fl. disci plurimi. Capitula mediocria, ramos subcorymbosos terminantia.

3. H. ANGUSTIFOLIA DC. Diffusa; foliis caulinis integerrimis; ligulis 12–15; pappo fl. disci aut nullo aut squamellato minimo. — *H. multicaulis* Hook. & Arn.? *H. decumbens* Nutt. Pl. Gamb. — Var. BARCLAYI: acheniis disci minus inanibus pappo paleaceo laciniato haud inconspicuo, radii permaturæ magis incurva insigniter rostellato. Monterey, Barclay. San Luis Obispo, Brewer.

4. H. CORYMBOSA Torr. & Gray. Erecta, corymbosa; foliis caulinis plerisque pinnatifidis; ligulis 15–25; pappo florum disci squamellato minimo, ovariis abortivis. — *H. angustifolia* Benth. Pl. Hartw. *H. macrocephala* Nutt. Pl. Gamb. *H. balsamifera* Kellogg. *Hartmannia corymbosa* DC.

* * Receptaculum planum, paleis 8-10 discretis, singulis achenium sterile calvum disci semi-amplexantibus. Achenia radii 5, lævia, glabra. Capitula virgato-racemosa, angusta, ligulis latis brevibus. Herba habitu glandulisque fere *Calycadeniæ*.

5. H. VIRGATA Gray, Bot. Mex. Bound. p. 100.

* * * Receptaculum convexum vel conicum, multiflorum, totum paleaceum, paleis discretis. Ligulæ plurimæ, breves. Achenia radii 2–3-seriata, parum rugosa, disci exteriora vix inania. Capitula mediocra. Folia inferiora pinnatifida. (*Hemizonia* sect. *Olocarpha* DC. pro parte.)

+ Pappus nullus.

6. H. MACRADENIA DC. Folia ramealia et bractealia glandula truncata superata; involucri squamæ etc. glandulis longe valideque stipitatis ornatæ; receptaculo conico.

7. H. PUNGENS Torr. & Gray. — *Hartmannia pungens* Hook. & Arn.; Hook. Ic. Pl. t. 334. — Receptaculi paleæ spinuloso-acuminatæ.

which is evidently of this genus, although it overpasses the limits of the subtribe in having a pappus in the ray, while the disk-akenes may per-

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+– +– Pappus e paleolis linearibus basi subconcretis apice fimbriolato-barbatis constans: paleæ receptaculi muticæ villoso-barbatæ.

8. H. Fitchii Gray, Bot. Whippl. p. 52.—Foliis lobisve in spinulam desinentibus pungentibus (ut in præcedente) horrida.

§ 2. Euhemizonia. (*Hemizonia* DC. quoad spec. typica utraque sectione.) Achenia fertilia (radii) lævia, parum obliqua, areola epigyna depressa vix excentrica, basi stipite tenui manifesto inflexo; disci abortiva, pappo nullo. Paleæ receptaculi convexi discum totum occupantes, interiores tenues, exteriores magis herbaceæ. Folia subintegerrima, villosæ. Capitula mediocria, subcorymbosa, multiflora, ligulis alte trilobis sæpius biseriatis. Flores lutei vel albi, meridiani.

9. H. congesta DC.—Flores lutei: paleæ exteriores receptaculi fere discretæ.

10. H. luzulæfolia DC.—*H. sericea* Hook. & Arn. *H. rudis* Benth. Bot. Sulph.; forma æstiva vel autumnalis, ramosissima, microcephala, glanduloso-viscosissima.—Flores albi: receptaculi palearum series exterior in cupulam concreta.

§ 3. Calycadenia. Achenia radii fertilia obovoideo-triangularia, subgibbosa, areola epigyna parum excentrica, aut glabra aut parce pilosa; disci longiora, deorsum angustata, sæpius quadrangulata, pappo paleaceo superata, omnia ovulifera, exterioria nonnulla fertilia. Paleæ receptaculi plani inter discum et radium, involucrum interius efficientes. Folia angustissima, integerrima, superiora cum bracteis etc. sæpissime glandulis magnis disciformibus vel acetabuliformibus superata vel conspersa. Capitula parvula, ligulis 1–7 latis palmato-trifidis vel tripartitis. Flores albi rariusve lutei, anthesi in nonnullis (an omnibus?) vespertini et matutini.

* (*Osmadenia* Nutt.) Paniculato-ramosissima, effusa, glandulis *Calycadeniæ* adempta, capitulis ramulos filiformes terminantibus: achenia rugosa, basi tenuiter stipitata, apice rostello crasso superata.

11. H. tenella. *Osmadenia tenella* Nutt. *Calycadenia tenella* Torr. & Gray.

* * Laxe paniculato-ramosa, capitulis axillaribus terminalibusque subsessilibus, bracteis foliisque nonnullis glandula acetabuliformi brevi-stipitata terminatis: achenia lævia nec basi nec apice producta.

12. H. Fremontii. *Calycadenia Fremontii* Gray, Bot. Mex. Bound. p. 100.—Flores radii 5–7, disci ad 20.

13. H. pauciflora. *Calycadenia pauciflora* Gray, l. c.—Flores radii solitarii, disci sæpius 3.

* * * (*Calycadenia* DC.) Virgata, sæpius stricta, axillis capituliferis, glandulis acetabuliformibus seu disciformibus haud raris: achenia apice truncata, areola epigyna majuscula parum elevata.

+– Molliter pubescens, capitularum glomerulis axillaribus laxis subpedunculatis.

14. H. mollis. *Calycadenia mollis* Gray, Proc. Am. Acad. 7, p. 360.—This

haps all become fertile; and the plumose disk-pappus is very like that of *Blepharipappus*, a slender form of which in the Kew herbarium was in the Genera Plantarum mistaken for a *Hemizonia*. Moreover,

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is a handsome species, with its copious bright white flowers displayed towards sunset and through the early morning; and is well worthy of cultivation.

+ + Glaberrima, foliis infimis tantum setoso-hispidulis, capitulis dissitis solitariis; pappi paleis brevibus muticis, raro nullis.

15. H. TRUNCATA. *Calycadenia truncata*, DC.

+ + + Setoso-hirsuta vel hispida, præsertim ad margines foliorum et bractearum, capitulis in axillis sessilibus solitaris vel glomeratis, pappi paleis aut fere omnibus aut alternis aristato-subulatis.

16. H. DOUGLASII. *Calycadenia villosa* DC. — Flores ut dicitur lutei: capitula in axillis solitaria, sæpius dissita. — In transferring this, I venture to change the specific name. It is seldom if ever villous, and usually hardly at all hirsute. Unless the color of the flowers may be relied on, it will be difficult to distinguish the species from slender forms of the following.

17. H. MULTIGLANDULOSA. *Calycadenia multiglandulosa* & *C. cephalotes* DC. — Flores albi, quandoque carnei? Capitula saltem superiora sæpius glomerata, nunc spicato-conferta.

§ 4. BLEPHARI'ZONIA. Achenia omnia turbinata fere æquilatera, hirsuta, acute 10-costata, areola epigyna majuscula centrali haud prominula, intima disci tantum sterilia, omnia pappifera! Pappus fl. disci ex aristis circiter 20 æqualibus barbato-plumosis, radii e coronula pateræformi subscariosa margine ciliata constans! Cæt. fere *Calycadeniæ*.

18. H. PLUMOSA. *Calycadenia plumosa* Kellogg, in Proc. Calif. Acad. 5, p. 49. —Near Stockton, California, sent by an unknown collector to Dr. Kellogg, from whom I have a branch. An anomalous species, which it is wonderful should have been overlooked, if it really grows in a district so often traversed by botanists as the neighborhood of Stockton. It has three remarkable peculiarities, — 1. The 10-ribbed or acutely 10-nerved achenia; 2. A distinct coroniform pappus to the ray-achenia, in which it departs from the character of the subtribe, but something like it is occasionally seen in *Layia;* 3. The pappus of the disk-akenes (most of them fertile) consists of plumose awns instead of naked paleæ, in this respect approaching *Blepharipappus;* but the style-branches, &c., are as in *Calycadenia*. Dr. Kellogg describes the flowers as yellow, but they may have been white. The *Calycadenia*-like glands are copious and light-colored. Chaff of the receptacle not forming a cup, as described by Dr. Kellogg, but of distinct scales, occupying more than one series. Moreover, the achenia are not "obcompressed," nor is it clear what is meant by their being "imbedded in the densely villous disk."

Excludendæ. *H.? ciliata* Torr. & Gray (*Hartmannia ciliáta* DC.) is *Oxyura chrysanthemoides* DC. = *Layia chrysanthemoides* Gray. — *H. filipes* Hook. & Arn. is *Lagophylla filipes* Gray. — "*H. sp.* coll. Bridges, no. 118," Benth. & Hook. Gen. l. c. = *Blepharipappus scaber*, Hook. var.

a form of *Blepharipappus scaber* (var. *subcalvus*) occurs, in which the pappus both of the ray and disk is reduced to a mere vestige. The style of the disk-flowers of that genus, however, is characteristic, but the distinction between the *Madieæ* and the *Galinsogeæ* is evanescent.

LAYIA Hook. & Arn., Gray, Pl. Fendl., with *Oxyura* DC. added (as in the Genera Plantarum), is best disposed under three sections.

The first, *Madaroglossa*, has the receptacle chaffy only at the margin between the ray and the disk (if also among some of the outer flowers, only inconstantly so); the stout bristles or slender awns of the pappus long-plumose or villose (or within woolly) below the middle; akenes all narrow, those of the ray crowned with a protuberant and annular or obscurely cupulate epigynous disk, sometimes imitating a coroniform pappus (abnormally, they now and then bear rudiments of true pappus); and all the species are beset with more or less copious dark stipitate glands among the hispid pubescence. The white-rayed species are *L. glandulosa* Hook. & Arn. (with a Californian variety, *rosea*), known by the crisped and interlaced wool on the inner side of the pappus-bristles; and *L. heterotricha* Hook. & Arn., with the less copious wool all straight, none of the interior crisped. *L. carnosa* Torr. & Gray may also be referred to this section, its very short rays seeming to be white, the pappus as in the preceding. The yellow-rayed species are *L. hieracioides* Hook. & Arn., with very short rays; *L. gaillardioides* Hook. & Arn., and *L. elegans* Torr. & Gray, with ample rays, the latter known by its pappus being similar to that of *L. glandulosa*.

The second section, *Callichroa*, is very like the yellow-rayed portion of the first, except that the setæ of the pappus (5 to 25) are naked; in *L. pentachæta* Gray, slender and smooth, sometimes reduced to two or three, or even with no pappus at all. At Forest Hill, Placer Co., California, Dr. Bolander gathered specimens apparently growing with this species and undistinguishable from it, except by the pappus, which refers them to *L. gaillardioides*. Of *L. platyglossa* Gray, there is a variety, *breviseta*, with pappus very much shorter than the corolla or achenium, collected near Los Angeles by Dr. Bigelow.

The third section, *Calliglossa*, has chaff to all the disk-flowers, obovate or oblong akenes, the pappus of subulate awns or more dilated paleæ, or none at all; the scales of the involucre woolly or woolly-ciliate within at the infolded portion; and there are no stipitate glands.

Its larger subdivision, with a pappus and a flat receptacle, contains *L. calliglossa* Gray, with some marked varieties as to the awns of the pappus, and *L. Fremontii* (*Calliachyris* Torr. & Gray), with conspicuously paleaceous pappus and some sparse long *villi* interposed or barely adnate to their base, which seem to represent the *villi* of the pappus in *Madaroglossa*, but are hardly distinguishable from those that clothe the achenium. The smaller subdivision, containing *L. chrysanthemoides* (*Oxyura* DC.), has a very convex receptacle, glabrous disk-akenes, and no pappus.

L. Douglasii Hook. & Arn. remains an obscure and ambiguous species. It is very briefly described from a specimen collected by Douglas "between the Narrows and the Great Falls of the Columbian River;" and the character "pilis eglandulosis setosa" implies that it agrees with the *Calliglossa* section in having no stipitate dark glands, while the rays are said to be "white." Doubt is not removed by the inspection of two or three disk-flowers which I possess from the specimen in the Hookerian herbarium. The ovary in these is glabrous; and the pappus consists of rather stouter and flatter awns than in any *Madaroglossa*, but fringed near the base with scanty long-villous hairs. It remains uncertain, therefore, whether the species belongs to *Madaroglossa* or *Calliglossa*, more likely to the former, unless the receptacle should prove to be chaffy throughout.

The tribe HELENIOIDEÆ, as now constituted, differs from the *Heleniεæ* of De Candolle in the exclusion of the *Madieæ* and the inclusion, as sub-tribes, of the *Flaverieæ* and the *Tagetineæ*, the latter embracing the *Pectideæ*. The separation of the *Euhelenieæ* and the *Bærieæ* into equivalent subtribes does not seem to be justified by any clear and tangible differences. The *Helenioideæ* are almost all American. For the Flora of California, in which they are largely represented, the following subtribes are adopted: 1. *Jaumieæ*, with regularly imbricated and broad involucral scales; 2. *Riddellieæ*, with persistent rays in the manner of *Zinnia* (includes *Whitneya* as well as *Riddellia*); 3. *Helenieæ* with nearly equal scales to the involucre, deciduous rays, and no oil-glands; 4. *Tagetineæ*, with oil-glands. The *Flaverieæ* are not represented in California.

JAUMEA Pers. The close relationship of *Coinogyne* Less. with the Buenos-Ayrean *Jaumea* was suggested in Bot. Mex. Boundary and elsewhere: their union by Bentham is no doubt to be sustained, however it may be as respects *Espejoa* and *Chæthymenia*. But the Californian *C. carnosa* is distinguished by something more than "pedunculis brevioribus et capitulis radiatis," as it has also a highly conical receptacle and no pappus.

PERITYLE Benth. The pappus, viz., the crown of squamellæ, which belongs to all the species of this genus and to no *Laphamia*, forms the best character for distinguishing these two genera. Mr. Bentham proposes to transfer from *Perityle* the species which have subulate instead of linear style-appendages. But this separates plants of wholly similar aspect and structure, and would bring into *Perityle* the *Laphamia dissecta*, which has short and obtuse style-appendages. I do not find that the involucral scales are to any extent or with any uniformity wrapped around the outermost akenes. *Perityle Emoryi* and *P. nuda* (forms of one species), although referred by Bentham to *Laphamia*, have short and obtuse style-appendages in our specimens; but a plant which I cannot otherwise at all distinguish, collected on Carmen Island, in Lower California, by Dr. E. Palmer, in 1870, has them subulate and acute. As to the character "receptaculum convexum vel conicum," the receptacle was described and figured as flat in the original *Perityle:* in fact it is barely convex in some species, but strongly so in others.

WHITNEYA Gray. Since this genus was characterized, from scanty specimens, I have myself collected the plant, and have received from Drs. Bolander and Kellogg specimens with well-formed fruit. Upon these materials the genus is newly characterized for the Flora of California. The principal points of emendation are these: 1. The ligules become papery, almost as much so as in a *Zinnia*, and persist on the achenium, with which they are articulated indeed, but from which they are not readily separated: the 10 to 16 nerves are prominently decurrent down on the short tube of the ray. 2. The ovaries of the disk are all sterile, although the style-branches bear obvious stigmatic lines; and the disk-corollas appear equally to persist on the sterile achenia. 3. The rays mostly bear sterile filaments. 4. I do not verify Bentham's character of the inclusion of the ray-achenia in the scales of the involucre. They are concave close to the base, indeed, but not at all so as to embrace the achenium. The genus may be associated with

RIDDELLIA Nutt. The *Zinnia*-like persistence of the rays is not noted in the Genera Plantarum, except by the phrase "lamina rigidula." The rays do become more rigid than in

BAILEYA Gray. In this the persistent scarious rays want the tube, as is mostly the case in *Zinnia*. The affinity of these three genera (i.e. of *Riddellia*, *Baileya*, and *Whitneya*) now becomes manifest. They form a group in the *Helenioideæ* analogous to that of the *Zinneæ* in *Helianthoideæ*. In the Flora of California, now in preparation, I have accordingly formed of them the subtribe RIDDELLIEÆ.

BÆRIA and BURRIELIA. If the two genera are kept up in the manner proposed by Mr. Bentham, as seems on the whole advisable, the stress of the character of the latter should come rather upon the very short and few rays and the slender receptacle, than upon the form of the appendages of the style. The difference is not great between those of *Burrielia leptalea* Gray, with slender subulate appendage abruptly contracted from a broad basal portion, and those of *Burrielia* now *Bæria platycarpha*, which are truncate-capitate, but flat, with short central cusp; and in other *Bæriæ* this cusp is represented by a more or less obvious, or sometimes evanescent, setiform point. *B. maritima* has short rays, indeed, but they are broad and flat, and the receptacle is broadly and obtusely conical. The species of *Bæria* are as below.*

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* BÆRIA Fisch. & Meyer, Benth. & Hook.

§ 1. Pappus semper nullus; achenia apice rotundata, areola epigyna parvula. Folia integerrima. (*Bæria* Fisch. & Meyer.)

1. B. CHRYSOSTOMA Fisch. & Meyer., cum var. MACRANTHA, *Burrielia chrysostoma* var. *macrantha* Gray in Bot. Whipp. — Varies from these largest to depauperate and slender forms, with rays and involucral scales reduced to 5 or 6.

§ 2. Pappus uniformis, ex aristis paleisve aristatis 2–7, raro nullus? Achenia apice truncata, areola epigyna lata. (*Burrieliæ* sp. DC. etc.)

* Folia integerrima.

2. B. GRACILIS. *Burrielia gracilis* DC. — Receptaculum angustissime conicum, acutissimum: pappus ex aristis (in radio 2–3, disco 4–5) basi angusta sensim paleaceo-dilatatis. — In some specimens the awns are scarcely dilated at base, in others the paleaceous portion is lanceolate or almost ovate-lanceolate.

3. B. TENERRIMA. *Burrielia tenerrima* DC. *B. parviflora* & *B. longifolia*? Nutt. — Receptaculum latiuscule conicum parum acutum: pappus ex aristis tenuibus 2–5 basi in paleam late ovatam subito dilatatis. — Both this and the foregoing occur in very depauperate forms, either of which may have been De Candolle's *Burrielia tenerrima*, but I take this to be it. As they are distinguishable only by the pappus, they perhaps run together.

* * Folia in eadem stirpe integerrima et tripartita: pedunculus sursum crassior: pappi paleæ 6–7, oblongo-ovatæ, aristæ æquilongæ.

4. B. PLATYCARPHA. *Burrielia platycarpha* Gray.

§ 3. DICHÆTA. Pappus biformis, nempe ex aristis 2–7 cum paleis multo brevioribus muticis interjectis, nunc in eadem spec. nullus. Achenia areola epigyna latiuscula. Folia saltem infima pinnatifida vel laciniata. (*Dichæta* Nutt.)

* Folia pleraque integerrima, lato-linearia: ligulæ breves.

5. B. MARITIMA. *Burrielia* (*Dichæta*) *maritima* Gray. Pappus ex aristis 3–5 validis et paleolis pluribus angustis laciniatis interpositis.

* * Folia nonnulla tri-pluripartita: ligulæ majores.

6. B. FREMONTII. *Dichæta Fremontii* Torr. *Burrielia Fremontii* Benth. Pl. Hartw.; forma epapposa, an semper? Folia angustissime linearia, nunc integer-

Actinolepis DC., Benth. In several specimens of *A. multicaulis* DC., collected by Professor Brewer, there is a pappus to the disk-flowers, like that of the ray. This confirms the propriety of referring to this genus Nuttall's *Ptilomeris*, which accords with it in what is well taken as the leading generic character, namely, the enclosure more or less of the ray-achenia in the at length concave or involute scales of the involucre. This, I find, is equally the case with two species, one of which (on account of its setiform anther-tips and the pappus) I had referred to *Burrielia*, as then characterized, and the other to *Bahia*, from which it differs only in the anther-tips, and, as I now perceive, in the inclusion of the ray-achenia. Both, indeed, have an obtusely conical receptacle, which would exclude them from *Bahia* as characterized in the Genera Plantarum; but this is also the case, to an equal degree, in one or two species of the *Eriophyllum* section of *Bahia*.

The receptacle varies so widely in *Actinolepis* as now constituted that it may take in another species with a flat receptacle, namely, *Burrielia nivea* of D. C. Eaton; but this has peculiar achenia and pappus, and may be the type of a distinct genus.

As revised for the Californian Flora the genus is arranged as below.*

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rima, nunc trisecta: pappus ex aristis sæpius 4 tenuibus, cum paleis 6–8 brevissimis lineari-oblongis integerrimis vel bifidis, nunc nullus.

7. B. uliginosa. *Dichæta uliginosa* Nutt. Vegetior, foliis sæpissime pinnatifidis, rhachi lata: pappus ex aristis 2–3 paleaceo-subulatis et paleis 3–6 latissimis quadratis laciniato-fimbriatis, nunc plane nullus.—Var. tenella (*Dichæta tenella* Nutt.), forma tantum exigua, minus pinnatifida, ligulis involucrique squamis paucioribus.

* ACTINOLEPIS DC., Benth.

§ 1. **Ptilomeris.** *Bæriæ* § *Dichætæ* affinis: plantæ haud lanatæ, sæpissime glandulosæ; foliis oppositis pinnatipartitis, segmentis lineari-attenuatis; capitulis longius pedunculatis. Involucrum campanulatum vel hemisphæricum. Receptaculum alte acute conicum. Antheræ appendice oblonga superatæ.—*Ptilomeris* Nutt. *Hymenoxys* § *Oxypappus* Torr. & Gray.

* Glandulosa; ligulis 10–15 elongato-oblongis; involucri squamis oblongo-lanceolatis; receptaculo pl. m. pubescente.—Sequentes an species, an stirpes pappo solum diversæ?

1. A. coronaria. Pappo e paleis 10 (8–12) oblongo-lanceolatis in aristam productis, paucisve in radio nunc exaristatis.—*Ptilomeris coronaria* & *P. aristata* Nutt. *Shortia Californica* Nutt. in cat. hortul. *Hymenoxys Californica* Hook. Bot. Mag.; Torr. & Gray, Fl.

2. A. anthemoides. Magis glandulosa; foliis tenuiter dissectis; capitulis

SCHKUHRIA Roth. To this genus *Bahia pedata* and *B. biternata* Gray, with annual root and costate pappus, are properly referred by

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parum minoribus; pappo nullo. — *Ptilomeris* (*Ptilopsis*) *anthemoides* Nutt. *Hymenoxys calva* Torr. & Gray.

3. A. MUTICA. Præcedenti simillima, nisi pappo e paleis 6–8 quadrato-oblongis apice eroso-lacinulatis muticis, paucisve raro aristulatis. — *Ptilomeris mutica* Nutt. *Hymenoxys* Torr. & Gray.

* * Subpubescens, vix glandulosa; ligulis brevioribus ovalibus 6–8; involucri squamis ovatis; receptaculo glabro.

4. A. TENELLA. Omnibus partibus minor; pappo e paleis 5–8 quadratis apice latissimo fimbriatis, paucisve nunc tenuiter aristulatis. — *Ptilomeris tenella* & *P. affinis* Nutt. Pl. Gamb.

§ 2. EUACTINOLEPIS. Floccoso-lanata; foliis plerisque alternis, paucilobatis vel integerrimis; ligulis pauciusculis obovatis. Involucrum angustum. Receptaculum aut convexum aut obtuse conicum. Pappus 8–15-paleatus vel squamellatus.

* Capitula parva sessilia vel folioso-bracteata; ligulis (flavis) 5 vel paucioribus; receptaculo tantum convexo; antheris appendice ovato-lanceolata superatis; pappo e squamellis angustis inæqualibus sæpius 15, vel fl. disci nullo.

5. A. MULTICAULIS DC. Specimens collected by Professor Brewer have pappus to the disk as well as ray-flowers.

* * Capitula majora pedunculata; ligulis 6–8; receptaculo obtuse conico; antheris appendice tenera fere setiformi (modo *Burrieliæ*) superatis; acheniis omnibus papposis.

6. A. WALLACEI. Albo-lanosissima; foliis obovatis spathulatisve apice nunc 3-lobatis; styli ramis cono subulato superatis; pappi paleis 8–10 brevibus obtusis muticis enerviis. — *Bahia Wallacei* Gray in Bot. Whippl. p. 49; forma normalis ligulis aureis. — Var. RUBELLA, ligulis roseo-purpureis albisve. *Bahia rubella* Gray in Bot. Mex. Bound. p. 95.

7 A. LANOSA. Albido-lanata; foliis linearibus sæpissime integerrimis; ligulis albis vel roseis; acheniis gracillimis; styli ramis obtusis vel tenuissime apiculatis; paleis pappi 8 vel 10 biformibus, 4 vel 5 subulatis in aristam attenuatis, alternis minoribus vel brevioribus exaristatis. — *Burrielia* (*Dichæta*) *lanosa* Gray in Bot. Whippl. p. 51. — In both these, and especially in the present species, the scales of the involucre each enclose a ray-achenium.

§ 3. EATONELLA. Floccoso-lanata, depressa; foliis (spathulatis integerrimis) plerisque alternis sed confertis; ligulis 8–9 parvulis. Receptaculum planum, callosum. Antheræ appendice latiuscula obtusa superatæ. Achenia linearia, compressa, faciebus planis nitidis, marginibus callosis villosissimis: pappus e paleis hyalinis 2 ovatis in aristam productis.

8. A. NIVEA. *Burrielia nivea* D.C. Eaton, in S. Watson, Bot. King, p. 174, t. 18. — Achenia of the ray partly enclosed in the concave scales of the involucre.

Bentham, as also *Achyropappus* HBK. The North American species are characterized below.* I have to add a peculiar perennial species.

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* § 1. SCHKUHRIA VERA. Capitulum pauciflorum: involucrum turbinatum vel in sicco pyramidatum, e squamis 4–5 obovatis apice sphacelato coloratis: ligulæ 1–2 brevissimæ imperfectæ: achenia obpyramidato-tetragona. Folia vel segmenta fere filiformia.

1. S. HOPKIRKIA Gray, Pl. Wright, 2, p. 94. Ramosissima; capitulis 3–4-floris; ligula unica nunc nulla; acheniis ad angulos villosissimis faciebus trinervatis; pappi paleis 8 conformibus ovatis corollam æquantibus nervo valido excurrente aristellatis. — *Hopkirkia anthemoidea* DC. — Southern borders of Arizona, C. Wright, and Mexico.

2. S. WRIGHTII Gray, l. c. Gracilis; capitulis 3–5-floris; ligula unica; acheniis præcedentis sed minus crassis; pappi paleis 8 conformibus obovatis muticis basi tantum incrassatis corolla paullo brevioribus. — Southern borders of Arizona, near Santa Cruz, Sonora.

§ 2. ACHYROPAPPUS. Capitulum pluri–multiflorum: involucrum sæpius hemisphæricum: ligulæ 5–12 exsertæ, raro nullæ: corolla limbo magis ampliato. (Achenia in nostris attenuata.)

* Ramosissima, gracillima, glabella; foliorum segmentis angustissime linearibus integerrimis: pappi paleæ 8 obovatæ, muticæ, præter basim incrassatam opacam enerviæ.

3. S. NEO-MEXICANA Gray, Pl. Fendl. p. 96. Spithamæa; pedunculis breviusculis subpaniculatis; ligulis nullis; pappo corollam subæquante. — Santa Fé, &c., New Mexico.

4. S. BIGELOVII. Ultrapedalis; foliis caulinis plerisque oppositis; pedunculis elongatis filiformibus; ligulis 8–9 oblongis; pappo tubo corollæ disci breviore. — *Bahia* (*Achyropappus*) *Bigelovii* Gray, in Bot. Mex. Bound. p. 96.

* * Ramosa, humilis; foliis plerisque oppositis pinnato-3–5-partitis, segmentis linearibus: pappi paleæ 8–9 lanceolatæ, costa valida percursæ: achenia vix angulata.

5. S. WOODHOUSEI. *Achyropappus Woodhousei* Gray, Proc. Am. Acad. 6, p. 546. — New Mexico, Dr. Woodhouse.

* * * Pedalis ad bipedalem, cinereo-puberula; foliis alternis pedati- vel palmatisectis; capitulis in caule apice nudo corymbosis: pappus e paleis 10–14.

6. S. PEDATA. Foliorum segmentis obovatis vel cuneato-oblongis; pappi paleis obovatis retusis, costa valida infra apicem evanida. — *Bahia pedata* Gray, Pl. Wright, 1, p. 123. — Western borders of Texas, &c.

7. S. BITERNATA. Foliorum segmentis linearibus; pappi paleis lineari-lanceolatis costa excurrente aristatis achenio subæquilongis, vel in fl. extimis latioribus muticis. — *Bahia biternata* Gray, Pl. Wright, 2, p. 95. — New Mexico.

§ 3. PLATYSCHKUHRIA. Capitulum floresque *Achyropappi*, habitu proprio, radice perenni etc. ut in char. specif.

8. S. INTEGRIFOLIA. Cinereo-puberula, nunc glabrata; caulibus floriferis e caudice multicipiti erectis spithamæis sæpius scapiformibus basi tantum foliosis

HYMENOTHRIX Gray, Pl. Fendl. p. 102, & Pl. Wright, 2, p. 97. By the admission of the above-mentioned perennial species into *Schkuhria*, the difference between that genus and the present is lessened; but still this should hold, *H. Wrightii* being especially peculiar, and the original *H. Wislizeni* nearer to it than to any thing else. It should be noted that the flowers of *H. Wrightii* are not yellow, as in the other, but pale purple or flesh-color.

BLENNOSPERMA Less. This genus seems to have no very evident relationship to those with which it is associated in the Genera Plantarum. In the character no mention is made of three peculiarities: 1. the completely sessile ligule; 2. the inner row of pistillate apetalous flowers, which appear to be constant in the Californian species; and 3. the powdery papillæ of the achenium and their development of delicate threads when wetted, forming a gelatinous mass, as in *Crocidium* and other Senecioneous Compositæ, and which indicate an affinity in that quarter.

CHÆNACTIS DC. well includes *Acarphæa* Gray. Few if any of the species have perennial roots. *C. carphoclinia* Gray is an anomaly in the tribe on account of the paleæ of the receptacle.

NICOLLETIA Gray. This (not *Nicolettia*) is the proper orthography of the name of this genus, which was dedicated to the memory of T. N. Nicollet, under whom Fremont performed his first service in survey and exploration.

DYSODIA Cav. Although the pappus generally consists of only 10

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apice corymboso-1–5-cephalis; foliis alternis crassiusculis coriaceis ovalibus nunc oblongis leviter trinerviis integerrimis in petiolum gracile subito angustatis; involucri hemisphærici squamis 10–14 oblongo-lanceolatis acutis disco brevioribus; ligulis 6–9 exsertis oblongis sæpe 3-dentatis; acheniis lineari-cuneatis 4-gonis; pappi paleis lineari-lanceolatis hyalinis costa valida excurrente vel procurrente subaristatis, vel mucronatis vel fl. exteriorum oblongis omnino muticis. — Denudated high plains and valleys in the Rocky Mountains of Wyoming, Valley of Wind River, &c.; Dr. Parry, coll. 1873, no. 150.

Var. OBLONGIFOLIA, minor; caule sat folioso; foliis lanceolato-oblongis; floribus in capitulo angustiori minus numerosis. — Hillsides in the valley of San Juan (Utah or New Mexico), Newberry in McComb's expedition. Head in specimen of this form (which has been for several years in the herbarium) barely 5 lines high and rather narrow; but in Dr. Parry's plant half an inch high and much broader. In the latter the flowering stems are usually scapiform, with some small bracts in place of leaves; the blade of the tufted radical leaves an inch to an inch and a half long, and about half as wide. Flowers yellow: disk-corolla with broadly funnel-form 5-lobed limb from a narrow tube. Style-branches capitate-truncate, with a short conical apiculation.

paleæ, Bentham's *D. anthemidifolia* of Lower California is said to have about 20. The following I had at first taken for a variety of *D. porophylloides* Gray, Pl. Thurb.

Dysodia Cooperi. Scabro-puberulum; foliis (caulinis ignotis) ramealibus lanceolatis crassiusculis sessilibus inciso-dentatis basim versus utrinque in segmentum lanceolato-subulatum stipulæforme partitis, superioribus in bracteas subulatas diminutis; capitulo pollicari bracteis calyculiformibus numerosis in squamas involucri lineari-subulatas sensim acuminatas transeuntibus; ligulis "purpureis" lineari-oblongis breviter exsertis; acheniis puberulo-hirtellis, pappi paleis circiter 9-setosis. — South-eastern borders of California, on the eastern side of Providence Mountains, Dr. J. G. Cooper.

Helenium Linn. I cannot at all accept the idea that *Amblyolepis* DC. belongs to this genus. The habit of the plant, the clasping leaves wholly destitute of impressed punctures (and with somewhat the odor of Melilotus in drying), the long bristly hairs, and the peduncules nodding before anthesis in a Cichoriaceous fashion, are too peculiar: so is the abrupt change from the foliaceous outer series of involucral scales to inner scarious ones, as hyaline as the paleæ of the pappus, and hardly larger. Then the disk-corollas, instead of the very short tube and cylindraceous limb with very short and blunt glandular teeth of *Helenium*, have a slender tube and a cyathiform or funnel-form 5-cleft limb; the lobes deltoid-lanceolate, acute, and glabrous. The achenia with 10 very thick ribs are somewhat peculiar. But the rays with ligule destitute of tube are as in *Helenium*. The tube to the disk-corolla is well developed in two anomalous *Helenia*, *H. Hoopesii* and the *Actinea integrifolia* HBK., which Bentham associates with it. Perhaps it would not be amiss to restore the genus *Oxylepis* for these.

Leptopoda Nutt. is well united to *Helenium*. But the union clearly carries with it *Hecubæa*, i.e. DeCandolle's *Hecubæa*, whatever that of Bentham (or Bourgeau's plant) may be. My reference of Ghiesbreght's plant (in Proc. Am. Acad. 7, p. 359) to *Hecubæa* DC. was based on a comparison with an imperfect original specimen; and I am still disposed to think that the species are not distinct. However this be, it may be affirmed of both that the characters — "involucrum late turbinatum, bracteis . . . basi connatis: receptaculum elevato-conicum," and "receptaculo valde elevato" — do not apply. The receptacle, however, is not "planiusculum," as De Candolle describes it, but in Ghiesbreght's plant rather more than hemispherical. The rays in the latter sometimes possess and sometimes want the style. I doubt if they are truly fertile in either.

A little scarious chaff on the receptacle is not uncommon in *H. nudiflorum* and I believe in *H. autumnale* also. An arrangement of the known species is subjoined.[*]

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[*] HELENIUM Linn.

§ 1. EUHELENIUM. Ligulæ fertiles, rarissime imperfecte styliferæ vel neutræ, sæpius nutantes. Corollæ disci tubo proprio brevissimo vel subnullo. Pappi paleæ haud dissectæ. Caules plerumque ramosi.

* Annua vel biennia; capitulis parvulis nunc mediocribus; corollis disci in eadem stirpe 4–5-dentatis.

+– Pappus brevissimus, e paleis rotundatis ecostatis muticis.

1. H. QUADRIDENTATUM Labill. Foliis inferioribus sæpius laciniato-pinnatifidis; capitulo elongato, nempe disco oblongo-ovato ligulis plerumque duplo longiore; receptaculo oblongo-cylindraceo. — S. Atlantic States to Mexico.

2. H. MICROCEPHALUM DC. Gracile; foliis angustis, radicalibus pinnatifidis; capitulis corymbosis vel paniculatis parvis; disco globoso ligulas paullo parumve superante; receptaculo ovato vel subgloboso. — *H. heterophyllum* DC. Prodr., quoad stirp. Berland. no. 2113. *H. Texanum* Buckley. — Var. BICOLOR Torr. & Gray. *H. elegans* DC. l. c. — Texas and adjacent parts of Mexico, to Tantoyuca, Ervendberg. Var. *bicolor* has a more depressed globular head, and the receptacle approaching hemispherical instead of ovate; but it is similar in some specimens of the ordinary form. De Candolle's *H. heterophyllum* is, at least mainly, represented in his herbarium by Berlandier's no. 2113, from Reynosa, Tamaulipas, which is the same as his no. 1429, from Laredo, Texas; but the character of the pappus in the Prodromus is inapplicable to this species.

3. H. AMPHIBOLUM. Major; foliis radicalibus ignotis, superioribus remote denticulatis vel integerrimis; capitulis sparsis longius pedunculatis; disco globoso subdepresso ligulis rite evolutis breviore; receptaculo ultra-hemisphærico. — *H. Mexicanum* DC. Prodr. 5, p. 666 (ex char. pappi, etc.), non HBK. — Mexico. State of Chihuahua, near Monterey, Berlandier (no. 145 coll. anno 1828), Dr. Gregg; and near Saltillo, Dr. Gregg. — Head nearly twice the size of the preceding species; the rays from fully half to at least a third of an inch long. Receptacle 2 lines high and almost 3 lines wide, forming nearly two-thirds of a sphere.

+– +– Pappus mediocris, e paleis obtusis muticis, costa vix ulla: receptaculum ovoideo-conicum acutiusculum.

4. H. OOCLINIUM. Tenuiter puberulum; caule corymboso-ramoso; foliis lineari-lanceolatis remote denticulatis (imis ignotis); ligulis pauciusculis disco ovato-globoso dimidio brevioribus; pappi paleis corolla disci ⅓–⅔ brevioribus oblongo-ovatis achenio subæquilongis. — State of Chihuahua, Mexico, in the Nazas Valley, Bolson di Mapimi, Dr. Gregg. — Herb doubtless 2 feet high, and with the aspect of the preceding, except that the rays are shorter (2 or 3 lines long), and the disk (often half an inch high and fuscous) inclined to ovoid. The well-developed receptacle is 4 lines high, and ovate-conical. This may be De Candolle's *H. heterophyllum* in part, as that is said to have a "capitulum ovato-globosum" and pappus twice or thrice shorter than the corolla, but this

Tanacetum Linn. On account of the corymbose heads and broad abrupt summit of the achenium, the following must be transferred to this genus: —

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in the present plant is not "obtusiusculis breviter aristatis." I do not find it among Berlandier's *reliquiæ* here; and that species, as already stated, was founded mainly on Berlandier's no. 2113, which is *H. microcephalum*.

+ + + Pappus mediocris vel majusculus, e paleis latis costa pl. m. perspicua percursis mucronatis aristatis vel acuminatis; receptaculum semi- vel subglobosum.

++ Folia lanceolata seu lanceolato-linearia, ima oblanceolata seu oblongo-spathulata: discus globosus.

5. H. Mexicanum HBK. Foliis subintegerrimis; capitulis corymbosis breviuscule pedunculatis; ligulis disco brevioribus; pappi paleis ovatis tenuiter apiculatis seu aristellatis costa subevanida percursis corolla 2–3-plo brevioribus. — *H. varium* Schrader; DC. Prodr. l. c.? Mexico. — Kunth does not mention the size of the pappus, either absolutely or relatively to the corolla; but in his specimen it is actually almost half the length of the disk-corolla; so that De Candolle's plant with pappus only one-fifth of the length of the disk-corolla is something else; and his as well as Schrader's *H. varium* is probably the true *H. Mexicanum*, — to which belong Andrieux's no. 190, and Hartweg's 130.

6. H. laciniatum. Humile, cinereo-puberulum; foliis sæpius pinnatifido-dentatis vel incisis; capitulis sparsis longe pedunculatis; ligulis disco dimidio brevioribus; pappi paleis ovatis in aristam corolla paullo breviorem subito angustatis. — California (probably on the southeastern borders), Coulter, no. 356, 358. Yaqui River, near the eastern side of the Gulf of California, in Sonora, Dr. E. Palmer.

7. H. puberulum DC. Elatum, paniculato-ramosum; foliis integerrimis; capitulis longe pedunculatis; ligulis disco dimidio vel multo brevioribus sæpe inconspicuis; pappi paleis ovatis breviter aristatis corolla 3–4-plo brevioribus.

++ ++ Folia angustissime linearia, innumera: discus globosus, ligulis sat magnis superatus.

8. H. tenuifolium Nutt. — Mississippi to Texas. Clearly the root is not perennial. The pappus is produced into long and capillary awns.

* * Perennia, surculis radicalibus biennibus renovata: pappi paleæ integræ vel eroso-denticulatæ, pl. m. acuminato-aristatæ: ligulæ discum globosum vel subdepressum æquantes sæpiusve superantes.

+ Neutri, rarius styliferæ steriles: receptaculum ovoideum.

9. H. nudiflorum Nutt. *H. nudiflorum, micranthum*, et *parviflorum* Nutt. in Trans. Am. Phil. Soc. n. ser. 7, p. 384, 385. *H. Seminariense* Featherman, in Louisiana Geol. Rep. *Leptopoda brachypoda* Torr. & Gray. — Var. purpurea, *H. atropurpureum* Kunth, Ind. Sem. Berd. 1845, p. 21. — Delaware? to Illinois and Texas. Varies with flowers all yellow, or the disk brown purple, or the rays partly or almost wholly brown purple. *H. parviflorum* Nutt. from Georgia, in my authentic specimen, has wholly neutral rays, and is manifestly of this spe-

TANACETUM POTENTILLOIDES. *Artemisia potentilloides* Gray, Proc. Am. Acad. 6, p. 551. The hirsute receptacle is peculiar. The

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cies. Dr. Engelmann communicated styliferous specimens which seem to be hybrids between this species and *H. autumnale.*

+- +- Ligulæ styliferæ fertiles : receptaculum semi-⅔-globosum.

++ Capitula mediocria vel majuscula: pappi paleæ corolla breviores.

10. H. AUTUMNALE Linn. Caule ad apicem usque folioso plerumque corymboso-polycephalo; foliis lato-lanceolatis nunc serratis; pedunculis sæpius brevibus.—*H. grandiflorum* & *H. montanum* Nutt. l. c. — Atlantic States and Canada to the Pacific.

11. H. BIGELOVII Gray, Bot. Whipp. p. (107) 51. Caule gracili sæpius simplici monocephalo; pedunculo elongato; foliis a linearibus ad lato-lanceolata integerrimis; capitulo sæpius majore. — Variat caule ramoso ligulis brevioribus. — California.

++ ++ Capitula magna, disco primum hemisphærico pollicem diametro, ligulis pollicaribus: pappi paleæ aristatæ corollam disci subæquantes: pedunculi longi validi, sæpius fistulosi, sub capitulo turbinato-incrassati ut in *Leptopoda.*

12. H. BOLANDERI Gray in Proc. Am. Acad. 7, p. 358. — Northern part of California along the coast, Bolander. — The small paleæ of the pappus are mostly sparingly laciniate-toothed, the teeth more or less prolonged and bristle-shaped.

§ 2. LEPTOPODA. (*Leptopoda* Nutt.) Ligulæ numerosæ neutræ. Pappi paleæ sæpe laceratæ vel fimbriatæ, costa nulla seu evanida. Caulis simplex e radice perenni, virgatus, apice plerumque longe nudo monocephalus. Cæt. *Euhelenii.*

* Receptaculum ovato-conicum: discus demum subglobosus: folia plerumque integerrima, fere glabra, pl. m. elongata, lanceolata, superiora linearia: achenia ad angulos hirsuta.

13. H. FIMBRIATUM Gray. Bi-tripedale, gracile; capitulo sat magno (disco ultra-semipollicari); pappi paleis ultra medium in setas plurimas capillares solutis. — Gray in E. Hall, List, Pl. Tex. no. 360. *Gaillardia fimbriata* Michx. *Leptopoda fimbriata* Torr. & Gray, Fl. 2, p. 387. — Florida to Texas. Rays three-fourths of an inch long. Disk in fruit 3 or 4 lines high, foveolate with the borders of the areolæ corneous, as in *H. vernale.*

14. H. CURTISII. Præcedenti simile; capitulo minore; pappi paleis lato-obovatis subintegerrimis corolla disci fere triplo brevioribus. — *Leptopoda brevifolia* var. Torr. & Gray l. c. *L. integrifolia* M. A. Curtis, Mss. — Near Raleigh, North Carolina, M. A. Curtis.

* * Receptaculum vix hemisphæricum: discus convexus.

+- Achenia glaberrima, immaturis resinoso-atomifera: pappi paleæ pl. m. laceratæ, setulæ haud raro aristellatæ.

15. H. NUTTALLII. — *Leptopoda Helenium* & *L. denticulata* Nutt. *L. decurrens* Macbride in Ell. — South Carolina to Florida and Louisiana. Foliage nearly as in *H. fimbriatum;* the stem less tall. — Var. INCISUM? *Leptopoda incisa* Torr. &

achenium is of thin and delicate texture, utricular, and it swells up into a jelly-like mass in water: under the microscope some of its cells are found to contain spiral threads.

ARTEMISIA Linn. The technical distinctions between this genus and *Tanacetum* are evanescent. As to the ribs of the akene, these are five and well marked in several species, among which are *A. tridentata* and *A. Norvegica.* And *A. Californica* has not only these, but the broad epigynous disk (more or less obvious in other species) is bordered by an obsolete pappus. On the other hand, the ribs disappear in some genuine *Tanaceta,* and the disk is very small in the turgid ripe achenia of *T. Sibiricum.* The habit and inflorescence furnish the more obvious distinctions.

Gray, l. c. This I do not possess. It was described from a specimen in Dr. Torrey's herbarium.

+- +- Achenia secus angulos hirsuta vel hirtella: folia breviora, crassiuscula.

16. H. VERNALE Nutt. Glabellum vel tomentuloso- vel viscidulo-pubescens; foliis nunc integerrimis nunc rariter dentatis vel incisis; pappi paleis obovatis spathulatisve apice lacerato-denticulatis vel erosis corolla dimidio (rarius triplo) brevioribus. — *Leptopoda puberula* Macbride in Ell. *L. pinnatifida* Nutt. — North Carolina to Florida.

17. H. BREVIFOLIUM. Fere glabrum; foliis brevibus plerisque spathulatis integerrimis; pappi paleis obovatis subintegerrimis; corollis disci apice atropurpurascentibus. — *Leptopoda brevifolia* Nutt. in Trans. Amer. Phil. Soc. 7, p. 373; Torr. & Gray, l. c. excl. var. — Georgia to Alabama.

§ 3. HECUBÆA. (*Hecubæa* DC.) Ligulæ sæpius fœmineæ (vix fertiles ?). Pappus nullus vel minutissimus coroniformi-squamellatus. Cætera *Leptopodæ.*

18. H. SCORZONERÆFOLIUM Gray, Proc. Am. Acad. 7, p. 359. *Hecubæa scorzoneræfolia* DC. Prodr. 6, p. 665, Deless, Ic. Sel. 4, t. 43. — Mexico, Alaman.

Var. GHIESBREGHTII Gray, l. c. — Chiapas, Mexico, Ghiesbreght, no. 118, 527, new distribution. — See remarks at the head of this article.

§ 4. OXYLEPIS. (*Oxylepis* Benth. Pl. Hartw.) Ligulæ numerosæ, lineari-cuneatæ, fertiles. Corollæ disci tubo proprio sat longo instructæ! Pappi paleæ subulatæ, enerviæ, integerrimæ. Perennes, andinæ, megacephalæ, habitu insigni.

19. H. HOOPESII Gray, in Proc. Acad. Nat. Sci. Philad. 1863, p. 65; Eaton in S. Watson, Bot. King, p. 175. — Rocky Mountains in Colorado Territory to the Sierra Nevada in California.

20. H. LANATUM. *Actinea integrifolia* HBK. Nov. Gen. & Spec. 4, p. 297, t. 410. *Oxylepis lanata* Benth. Pl. Hartw. p. 87. Mexican Andes. — I have no specimen of this, which Mr. Bentham finds is a near relative of *H. Hoopesii.* The receptacle must be much flatter, and the rays (about 40) much more numerous, as shown in Kunth's figure: the tube of the disk-corolla is represented as long as the limb. It is similar but shorter in the North American species.

CROCIDIUM Hook. The broad and flat branches of the style are decidedly Asterideous, as Mr. Bentham remarks; and the genus might be better placed there than among the *Senecioneæ*, except for the thread- and mucilage-bearing papillæ of the akenes, which are common in *Senecio*. In this respect, as in the shape of the achenium, and the broad and flat style-branches, no less than in the involucre and habit, it much resembles another genus of uncertain affinity, namely, *Blennosperma*, as was noticed long ago in the Flora of North America. I find that I once inadvertently mistook the latter for *Crocidium*, whence that plant was, in the Botany of the Mexican Boundary, said to have been collected in California. It has not yet been seen south of Oregon. The small cauline leaves, described as "omnia integra" in the Genera Plantarum, are mostly 3-cleft, as in Hooker's plate.

BARTLETTIA Gray cannot be nearly allied to *Crocidium*, having none of the peculiar characters of that genus.

PSATHYROTES Gray. The affinity of this genus with the two following seems to me unmistakable and close. Rather than to distribute them under different tribes, it might be better to take *Trichoptilium* also into the *Senecioneæ*, accounting the bristles of the pappus to be united at base to form the scales. But technically the latter genus has the character of the *Helenioideæ*. In the yet unpublished Flora of California I have ventured to unite with *Psathyrotes*, under the name of

PSATHYROTES (PEUCEPHYLLUM) SCHOTTII, the *Peucephyllum Schottii* Gray in Bot. Mex. Bound. p. 74. I had referred this plant to the *Eupatoriaceæ*, on account of the styles and the impressed-punctate leaves, supposing that the flowers were not truly yellow. Bentham recognized an affinity with his *Luina*, which has the same inappendiculate style. The flowers in other respects are apparently just those of *Psathyrotes*; and the style-branches of *P. scaposa*, although somewhat hispid, are equally destitute of any tip.

LUINA Benth. Notwithstanding its Inuloid style-branches, this genus is most related to *Tetradymia*, and indeed might almost be regarded as a section of it. Now that the long hairs of the achenium of the latter are known to be inconstant, *Luina* is distinguished from it only by the total absence of appendage or tip to the style-branches, and the less deeply cleft corolla, the lobes of which are much shorter than the tubular-funnelform throat. The midnerve of the corolla-lobes is equally apparent in *Luina*, and the anthers are soon completely exserted. A form seemingly of the original species (*Luina hypoleuca*, var. *Californica*) has been collected on the coast range of California behind Santa Cruz (also farther north), in which the lobes of the corolla are shorter than in Dr. Lyall's specimens.

TETRADYMIA DC. The style-branches of this well-marked genus seem never to be exactly "truncate and penicillate," but rather as figured in Delessert's Icones, with more or less of a conical tip, the base of the cone with some penicillation: occasionally the cone in *T. canescens* is more prominent, acute, and beset with a few stiff bristles. This is observed in some of the numerous specimens which have wholly glabrous ovaries. As the villosity of the akenes is not of generic or even of specific value, and the style-branches are somewhat variable, I am the more disposed to append to *Tetradymia* a plant of peculiar aspect, with twice as many flowers in the head as occur in *T. spinosa*, and with the involucre multibracteolate, so as to appear much imbricated. The acutish style-branches are peculiar (but not quite Asteroid): otherwise the flowers wholly accord with *Tetradymia.* The plant in view is

T. (LEPIDOSPARTON) SQUAMATA. *Linosyris squamata* Gray, Proc. Am. Acad. 8, p. 290. *Carphephorus junceus* Durand, in Pacif. R. R. Expl. 5, p. 8, non Benth.

RAILLARDELLA. I willingly adopt from Mr. Bentham the entire separation from *Raillardia* of these two interesting Californian species, *R. argentea* and *R. scaposa.* The scales of the involucre appear to be strictly in one series, and their edges are lightly united to the middle, although at length separating or separable. From the size, rigidity, and slight flattening of the bristles of the pappus, I still incline to refer *Raillardia* and *Raillardella* to the *Helenioideæ;* and *Dubautia,* although with paleaceous receptacle, is a manifest ally.

ARCTIUM Linn. Without raising any general question as to the recognition of Tournefortian genera when superseded by Linnæus, and where the Linnæan name has continued to prevail, I do not well see the necessity of reviving at the present day the Linnæan name *Arctium* (which included a Thistle as well as the Burdocks), after it has given way to *Lappa* Tourn., all the way from Jussieu down to De Candolle and Fries.

CNICUS Linn. For the reasons assigned by Mr. Bentham, and especially because he has done so in the new Genera Plantarum, it is best to adopt for the present genus this Linnæan rather than the Tournefortian name *Cirsium.* A revision of the North American species will be attempted in a separate article.

MICROSERIS Don. It is unfortunate, but inevitable, that this name should supersede the happier one of *Calais* DC., under which most of the species have been described; but, as Bentham shows, *Microseris* is identical with *Eucalais*, except, I would add, in the number of the pappus-paleæ. — From it, however, Mr. Bentham distinguishes *Scorzonella* Nutt., even placing it in another subtribe. In revising these plants for the Californian flora, I find myself unable to adopt this conclusion. The basal callosity of the achenium, hollowed at the insertion, is shared by *Microseris* proper throughout. As to the remaining character, that of the graduated imbrication of the scales of the involucre, there is a transition (as also in the pappus) through *M. sylvatica* to the section *Ptilophora*, and through *M. Parryi* to the other sections. And *M. aphantocarpha*, with all the other characters of *Eucalais*, has the pappus-scale more obsolete than in any form of *M. laciniata*, the long bristle being undilated, except at its very insertion. The species may be disposed under five sections, as follows.[*]

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[*] MICROSERIS Don, Benth. & Hook.

§ 1. PTILOPHORA. Pappi aristæ (14–22) albo-plumosæ: achenia nec apice vix inferne attenuata, teretia: involucrum calyculatum vel imbricatum. Biennes, radicibus fusiformibus. — *Ptilophora* Gray, Pl. Fendl. p. 112. *Calais* § *Ptilophora* Gray, in Bot. Whipp.

1. M. NUTANS. *Scorzonella* (*Crepis* Geyer) *nutans* Hook. *Calais nutans* Gray, l. c. *Stephanomeria intermedia* Kellogg. — Gracilis; involucrum fere biseriale, squamis exterioribus brevibus calyculum efficientibus.

2. M. MAJOR. *Calais* (*Ptilophora*) *major* Gray, l. c. cum syn. *Calais gracililoba* Kellogg in Proc. Calif. Acad. 5, p. 40, forma laciniato-pinnatifida. — Involucrum magis imbricatum triseriatum.

§ 2. SCORZONELLA. Pappi aristæ (8–10, raro pauciores) aut subplumosæ sordidæ, aut nudæ: achenia nec apice parum basi attenuata: involucrum imbricatum, squamis exterioribus gradatim brevioribus. Biennes, radice fusiformi. — *Scorzonella* Nutt. *Calais* § *Scorzonella* & *Anacalais* Gray, in Bot. Whipp. *Scorzonella* Benth. & Hook. Gen. Pl. 2, p. 533.

* Achenia gracilia *Ptilophoræ:* pappus subplumosus vel barbellatus. (§ *Anacalais* Gray.)

3. M. SYLVATICA. *Scorzonella sylvatica* Benth. Pl. Hartw. *Calais* (*Anacalais*) *sylvatica* Gray, in Bot. Whipp. l. c.

Var. STILLMANI: squamis involucri e basi angustiore sursum sensim attenuatis; pappi aristis (quandoque) minus barbellatis. — *Calais sylvatica*, forma, Gray in Bot. Whipp. l. c.

* * Achenia parum breviora, nunc 4–5-angulata, nunc teretia gracilia: aristæ pappi tenuiter denticulatæ vel scabræ.

+- Involucri squamæ longius acuminatæ: pappus e paleis 8–10 parvis arista prælonga capillari superatis: ligulæ elongatæ. Caulescentes vel subcaulescentes.

GLYPTOPLEURA Eaton. To the characters of this curious little genus, as made known by Eaton and by Bentham, may here be added

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4. M. LACINIATA. *Hymenonema ? laciniatum* Hook. *Scorzonella laciniata* Nutt. *Calais* (*Scorzonella*) *laciniata* Gray, l. c., cum

Var. PROCERA. *Calais* (*Scorzonella*) *glauca, procera* Gray, Proc. Am. Acad. 7, p. 364. *Hymenonema ? glaucum* Hook., forma minor.

5. M. LEPTOSEPALA. *Scorzonella leptosepala* Nutt. *Calais Bolanderi* Gray Proc. Am. Acad. 7, p. 365. *Calais laciniata* Gray, l. c. 8, p. 392; pl. coll. Hall, 313. — The narrower and gradually tapering scales of the involucre, as well as the smaller and mostly fewer-flowered heads, appear well to distinguish this species, which was indicated by Nuttall.

+ + Involucri squamæ omnes obtusiusculæ: pappus e paleis 5 bifidis arista e sinu exserente dimidio triplove brevioribus constans: ligulæ breviusculæ. Acaulis, scapis simplicissimis nudis.

6. M. PARRYI. *Calais Parryi* Gray in Bot. Whipp. & Bot. Mex. Bound. p. 104. — Akenes unknown, but probably beakless. The species was referred to *Calocalais,* on account of the pappus.

§ 3. EUMICROSERIS. Pappus e paleis aristatis 10 vel pluribus: cæt. *Eucalais.* Species 2 australes.

7. M. PYGMÆA Don. Annua, radice exili. — Chili.

8. M. FORSTERI Hook. f. Biennis, radicibus fusiformibus. — New Zealand and Australia.

§ 4. EUCALAIS. Pappus haud plumosus, sordidus, e paleis aristisve 5, raro paucioribus: achenia sæpissime breviuscula, ab apice lato truncato vel infra medium deorsum angustata: involucrum duplex, exterius breve calyculatum. Annuæ, acaules, radice exili, scapis simplicissimis nudis. — *Calais* § *Eucalais* DC.

* *Aphantocarpheæ,* nempe aristis pappi fragilibus nudis ima basi tantum dilatatis.

9. M. APHANTOCARPHA. *Calais aphantocarpha* Gray in Proc. Am. Acad. 6, p. 552.

Var. TENELLA. Forma pusilla, pappo 2–5-mero deciduo nunc evanido. *Calais* (*Aphanocalais*) *tenella* Gray in Bot. Whipp. p. 57, 58, t. 17. — Evidently this is a depauperate state of the species which I later described as *Calais aphantocarpha.* It is so large and tall as to render the older specific name inappropriate, so that in the transference I prefer the later name for the species. The slight contraction of the very summit of the achenium in the *C. tenella* does not seem to be wholly constant, nor of specific value.

* * *Eucarpheæ,* nempe paleis pappi sat magnis,

+ Ovato-lanceolatis ovatisve in aristam pl. m. acuminatis.

10. M. BIGELOVII. Acheniis brevibus (lin. 2 longis) subturbinatis sub apice non constrictis; pappi paleis ovato-lanceolatis extus tantum scaberulis in aristam gracilem sensim productis. — *Calais Bigelovii* Gray, in Bot. Whippl. p. 57, t. 17. *C. Douglasii* Gray, Bot. Whipp. l. c. (forma paleis pappi fere lanceolatis) &

that the scales of the involucre are united at base for nearly one-third of their length (as may best be seen from within), and that the stout

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Bot. Mex. Bound. p. 164. Apparently a common species in the neighborhood of San Francisco; wherefore it is singular that neither Douglas nor Nuttall collected it.

11. M. Douglasii. Acheniis gracilioribus fusiformibus (sæpe lin. 3½ longis); pappi paleis ovato-oblongis ovatisve extus villosis apice in aristam sat validam breviter attenuatis. — *Calais Douglasii* DC. Prodr. 7, p. 85; Hook. & Arn. Bot. Beech. p. 361. Collected, as far as I know, only by Douglas. Characterized from his specimens in the Kew herbarium (herb. Hook. and herb. Benth.). According to my notes, only some achenia are in De Candolle's herbarium, and there is no mention in them, any more than in De Candolle's Prodromus, of the copious villosity of the paleæ of the pappus, which is described by Hooker and Arnott, and could hardly be overlooked in their specimens. This may sometimes be wanting, as in the following species, to which *M. Douglasii* also approaches in the texture and form of the paleæ. [From observations communicated by Dr. Müller, the Curator of De Candolle's herbarium, it appears that the plant described in the Prodromus is the same as that in the Kew herbarium, perhaps with the paleæ of the pappus rather wider.] But the slender and truly fusiform achenia, tapering almost as much to the summit as to the base (nearly as in *Calocalais*), seems well to distinguish it both from the preceding and the following species. Its rediscovery is very desirable.

+ + Orbiculatis seu latissime ovatis subito aristatis: achenia brevia, valida, sub apice haud vel paullulum constricta.

12. M. cyclocarpha. Pappi aristis gracilibus palea sua 2–3-plo longioribus. — *Calais cyclocarpha* Gray in Bot. Whipp. l. c. t. 18. — Paleæ of the pappus usually glabrous or nearly so, but occasionally bearing a few long villous hairs on the back, so as to connect to this species the

Var. eriocarpha: pappi paleis extus sericeo-villosis arista vix dimidio brevioribus. — *Calais eriocarpha* Gray, Proc. Am. Acad. 6, p. 552.

13. M. platycarpha. Pappi aristis palea sua 2–3-plo brevioribus. — *Calais platycarpha* Gray in Bot. Whipp. & Bot. Mex. Bound. l. c. — Of this only Dr. Parry's original specimen is yet known. The young achenia do not show the slight neck of the preceding species.

§ 5. Calocalais. Pappus haud plumosus, sæpissime 5-paleaceus: achenia gracilia, fusiformia, sursum sensim nunc rostratim attenuata: involucrum subduplex, squamis exterioribus paucis inæqualibus, omnibus lanceolatis. Subcaulescentes, pedunculis scapiformibus simplicissimis, ligulis abbreviatis pallidis? — *Calais* § *Calocalais* DC.

* Pappi paleæ 5, oblongæ seu lanceolatæ, apice mox lacerato-bifidæ et ex sinu aristam tenuem proferentes. Annuæ, radice exili.

14. M. Lindleyi. Acheniis præsertim extimis vix minusve rostratim attenuatis; pappi rufescenti-sordidi paleis achenio subæquilongis scaberulis oblongo-lanceolatis, costa valida ex emarginatura in aristam scabram ipsa parum breviorem

beak of the achenium is funnel-like or tubular! Also, that Dr. Palmer's plant from southern Utah appears to be of a second nearly related species. The diagnoses of the two may be expressed as follows: —

G. MARGINATA Eaton. Foliis insigniter scarioso-limbatis, summis bracteisque (involucrum circiter 12-phyllum 15–18-florum æquantibus) lacinulis fere filiformibus pectinato-marginatis; ligulis (an semper?) parvis; acheniis cinerascentibus, rostro infundibulari. — Nevada Desert, on the borders of California.

G. SETULOSA. Foliis margine parum callosis, dentibus superiorum calloso-setiferis; bracteis calyculatis involucro angusto 8–12-floro 7–8-phyllo dimidio brevioribus; acheniis glabris, rostro usque ad basim

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producta. — *Calais Lindleyi* DC. l. c. *Uropappus heterocarpus* Nutt. l. c. ex char. This occurs, mixed with the succeeding, in various collections, with which it has naturally been confounded, and it has sometimes been named *Calais Douglasii.*

15. M. LINEARIFOLIA. Foliis junioribus nunc pubescentibus seu villosulo-ciliatis; acheniis plerisque rostrato-attenuatis; pappi albi paleis achenio sæpius brevioribus lineari-lanceolatis apice mox acute bifidis, costa tenui ex sinu in aristam capillarem ipsa plus dimidio breviorem producta. — *Calais linearifolia* DC. l. c. excl. syn. *Uropappus linearifolius* & *grandiflorus* Nutt. l. c.

16. M. MACROCHÆTA. Pappi paleis oblongis arista sua tenuissima ex sinu exserente achenioque rostrato-attenuato 2–3-plo brevioribus. — *Calais macrochæta* Gray Pl. Fendl. & in Bot. Whipp. l. c.

* * Pappi paleæ 20–24, angustissimæ, in aristam scabridam sensim attenuatæ!

17. M. TROXIMOIDES. *Troximo cuspidato* similis, fere acaulis; radice perenni crasso nigricante; foliis crassiusculis linearibus sursum attenuatis integerrimis vel margine undulato; scapo spithamæo ad pedalem foliis 1–2 parvulis nunc instructo; involucro cylindraceo vel subturbinato 20–30-floro e squamis lanceolatis sensim acuminatis subæqualibus; pappo albido achenio lineari sursum parum angustato longiore. — Two forms are known: one from hills on the Clear Water River, Oregon (now Idaho Terr.), collected by Mr. Spalding, and mistaken for *Troximon cuspidatum,* also Montana Territory, from an unknown collector. This has a little pubescence about the head, unripe akenes rather strongly 10-striate-ribbed, and hardly tapering upwards. The other is no. 600 in the collection distributed by Kellogg and Harford, probably from the northern part of the coast of California. The single specimen I have seen of this has a wholly naked scape, a narrower and glabrous involucre, a whiter pappus, the achenia more lightly costate, and apparently more tapering upwards. This and *Troximon cuspidatum* indicate a clear transition between the two rather widely separated genera. The akenes of the present anomalous plant are about four lines long, glabrous: the pappus half an inch long, of uniform awnlike paleæ, which are flat and about a quarter of a line long to near the middle, thence gradually tapering into the slightly rigid and scabrous awn. Calyculate scales of the involucre hardly any.

cavo. — Near St. George, on the southern border of Utah, Dr. Edward Palmer.

MALACOTHRIX DC. In the Flora of North America, thirty years ago, and with very incomplete materials, I ventured to reconstruct De Candolle's *Malacothrix*, founded on a single species in flower only, by adding to it three genera which were shortly before characterized by Nuttall; and later, in Plantæ Fendlerianæ, I added another species of anomalous aspect. The characters which confirm this view have one by one come to light, except as to Nuttall's *Malacomeris*, of which nothing more is even now known. The genus was said to be "most allied to *Andryala*." The affinity thus suggested is strengthened by the discovery I have just made that the receptacle of *M. commutata* is foveolate and fimbrillate-toothed, and also that in other species, with foveolæ not apparent, there are delicate setæ, usually one to each of the areolæ of the receptacle, or to some of them. These are most conspicuous and persistent in *M. Coulteri*, apparently the most anomalous of the species, on account of its scarious involucre. In *M. sonchoides*, *M. obtusa*, &c., and in the original *M. Californica*, they are sometimes manifest (either caducous or persistent), but usually of extreme tenuity, yet sometimes evanescent or wanting.

In Plantæ Fendlerianæ I first noticed the stronger and few or solitary outer bristles of the pappus which characterize certain species of the genus, among them the original *Malacothrix* DC. The mention of *M. sonchoides* was in consequence of my having confounded with Nuttall's species of the Upper Platte two other more western species, one of which (*M. Fendleri*) has this character, and the other (*M. obtusa*) seemed to have it. Later, Dr. Torrey, in Stansbury's Report, corrected what he naturally thought an inexact statement, by saying that "in *M. sonchoides* I believe the outer series always consists of *five* bristles." Next, in Plantæ Wrightianæ, part 2, when distinguishing *M. Fendleri*, I too hastily adopted Dr. Torrey's view, without comparing his supposed *M. sonchoides* of Salt Lake, which has five or more strong persistent bristles, with Nuttall's original specimen, which has none. If it had, they would hardly have escaped Nuttall's attention, who described the whole pappus as soft and "quickly deciduous in the mass." In natural consequence, Torrey's species came to be well described in the Botany of King's Exploration as *M. sonchoides*, while the real *M. sonchoides* of that work, as respects the Utah specimens, is described as *M. obtusa*. In rectifying the synonymy, it will be proper to name the species which brought in this confusion *M. Torreyi*, in memory of its first describer.

To this genus I propose to append an imperfectly known species, of the southern borders of California, which has no pappus at all. It may prove to be a state of a pappose species.

A conspectus of the species, as now understood, is added in a note.*

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* MALACOTHRIX DC., Torr. & Gray.

§ 1. Malacolepis Gray, Pl. Fendl. Involucrum gradatim imbricatum pluriseriale, e squamis latissimis albo-scariosis, costa tantum viridi. Herba annua, capitulis majoribus.

1. M. Coulteri Gray, l. c. Receptaculum setis capillaribus persistentibus inter flores onustum: ligulæ forte flavidæ demum purpurascentes. Pappus exterior e setis 1–2 validioribus lævibus fere persistentibus.

§ 2. Eumalacothrix. Involucrum pauciseriale, e squamis angustis parum scariosis.

* Annuæ, leptophyllæ, capitulis solitariis majoribus scapos simplices terminantibus, involucri squamis gradatim imbricatis, floribus luteis. — *Malacothrix* DC.

2. M. Californica DC. Laxe lanosa, nunc glabrata. Pappus exterior e setis 2 persistentibus cum denticulis nonnullis.

* * Annuæ, paniculato-ramosæ, capitulis minoribus, involucro plerumque biseriali, squamis interioribus æqualibus, exterioribus paucis brevibus calyculum referentibus, floribus pallide flavis demum purpurascentibus, foliis prasertim radicalibus runcinato-pinnatifidis. — *Leptoseris* Nutt.

+- Pappus exterior e setis validioribus nudis sat persistentibus 1–8.

3. M. Torreyi. Spithamæa ad sesquipedalem, fere glabra; ramis pedunculisque setis glanduliferis interdum parce munitis; capitulis mediocribus vel majusculis multifloris; involucro campanulato; achenio costis 5 subalato-prominulis insigniter angulato, valleculis bicostatis; pappo exteriori persistente e setis validis 4–8 (sæpius 5) denticulisque pluribus interjectis. — *M. sonchoides* Torr. in Stansbury, Rep. p. 392; Gray, Pl. Wright, 2, p. 105, p. p.; Eaton in Bot. King, p. 201, non Torr. & Gray, Fl. — From Salt Lake, Utah (Stansbury, S. Watson), to the western borders of Nevada (Anderson, S. Watson); and a slender, narrow-leaved form in southern Utah, collected by Dr. E. Palmer and Mrs. Thompson.

4. M. Fendleri Gray, Pl. Wright, 2, p. 104. Humilis, fere glabra; involucro campanulato; achenio nigricante cylindrico æqualiter 15-costato, apice manifeste cupulato margine integerrimo; pappo exteriori persistente unisetoso. — New Mexico and Texas, on the Rio del Norte from near Sante Fé (Fendler) to El Paso (Wright) and still lower (Bigelow); also Guadálupe Cañon, Capt. Smith.

5. M. Xanti. Sesquipedalis, glabra vel glabrata; foliis fere omnibus radicalibus runcinatis membranaceis; caule scapiformi gracillimo polycephalo; involucro cylindraceo; achenio castaneo costis 15 obtusis striato ob 5 paullo validiores angulato, apice cupulato obtuse 5-dentato; pappo exteriori e setis

CREPIS COOPERI = *Malacothrix crepoides* Gray, in Pacif. R. R. Expl. 12, p. 49, which is also no. 327 of Hall's Oregon collection. It

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3–5 gracillimis subpersistentibus. — *M. parviflora*? Gray, in Proc. Am. Acad. 5, p. 163, non Benth. — Cape San Lucas, Lower California, no. 67, coll. L. J. Xantus.

++ Pappus exterior præter denticulos minimos plane nullus. Capitula parva.

6. M. SONCHOIDES Torr. & Gray, Fl. Spithamæa, fere glabra; dentibus lobisve foliorum radicalium subspinuloso-apiculatis; acheniis fere linearibus 15-costatis ob costas 5 paullo majores sub-angulatis, apice haud contracto denticulis minimis albidis circa 15 coronulato. — *Leptoseris sonchoides* Nutt. in Trans. Amer. Phil. Soc. l. c. p. 438. *Malacothrix obtusa* Eaton, in Bot. King, l. c. quoad pl. Utah. — Upper Platte, Nuttall, Geyer (no. 40); Utah, S. Watson, Lieut. Wheeler.

7. M. OBTUSA Benth. Pl. Hartw. Spithamæa ad sesquipedalem; caulibus sæpius gracillimis amplius paniculatis subaphyllis; foliis radicalibus primum pl. m. albo-lanuginosis lobis dentibusque obtusis; acheniis obovato-oblongis pl. m. 15-costatis (costis secundariis aut prominulis aut fere evanidis), apice subcontracto annulo integerrimo. — *M. parviflora* Benth. l. c. est forma scaposa microcephala. — California, common. In this species the capillary bristles of the receptacle are often very evident, about twice the length of the akenes, and deciduous with them, very fragile, resembling bristles of the pappus.

* * * Annuæ, scaposæ, platyphyllæ, involucro præcedentis, floribus purpureis albisve. Pappus nullus. — *Anathrix.*

8. M. PLATYPHYLLA. Glaucescens; foliis dilatato-cuneatis venosis margine inæqualiter subspinuloso-denticulatis; scapo nudo ultrapedali superne laxe corymboso-ramoso polycephalo; involucri squamis propriis ovato-oblongis, accessoriis calyculi paucis brevibus. — S. E. California, in gravelly soil near Fort Mohave, Dr. J. G. Cooper.

* * * * Perennes vel biennes? basi nunc suffrutescentes. Receptaculum subalveolatum, alveolis dentatis.

+ Albifloræ (nunc purpurascentes), glabratæ, caulibus foliatis, capitulis sæpius paniculatis majusculis. — *Leucoseris* Nutt.

9. M. SAXATALIS. Tenuiter tomentulosa et glabrata, nunc fere glabra; foliis lanceolatis imisve oblongo-spathulatis nunc laciniato-pinnatifidis; acheniis lineari-oblongis 10-costatis, coronula prominulo 10-denticulato. — *M. saxatilis* & *M. commutata* Torr. & Gray, l. c. *Hieracium? Californicum* DC. *Sonchus? Californicus* Hook. & Arn. *Leucoseris saxatilis* & *Californica* Nutt. l. c. — Santa Barbara and southward.

10. M. TENUIFOLIA Torr. & Gray, l. c. & Bot. Mex. Bound. p. 106. Glaberrima vel mox glabrata; foliis angustissime linearibus vel filiformibus sæpe 3–5-partitis; capitulis paucis in pedunculis filiformibus; acheniis obovatis, coronula obscura. — *Leucoseris tenuifolia* Nutt. l. c.? — In the Botany of the Mexican Boundary, I stated that "from three to five of the bristles of the pappus are

is evidently a *Crepis*, of the *Youngia* section, although the scales of the involucre become somewhat carinate, with a thickened midrib at maturity.

CREPIS OCCIDENTALIS Nutt. Nuttall could not have seen any well-formed fruit of this when he characterized on it his genus *Psilochænia*, as having achenia "without any visible striæ," and one of his own specimens given to me by himself, and one of Wyeth's original collection given to Durand, are in flower only. At maturity they are in fact strongly 10-striate-ribbed, fully as much so as in his own *Crepis* (*Leptotheca*) *acuminata*, with which the species is connected by such gradations that it is very difficult to distinguish the two. The most robust form of this variable *C. occidentalis*, which may be designated as var. *costata*, has the thicker and almost columnar achenia costate by 10 very strong and salient ribs. Var. *crinita* is a remarkable form from Oregon, with the involucre densely and the peduncles sparsely beset with long and tortuous whitish bristles.

TROXIMON Nutt. The union of *Macrorhynchus* Less. with Nuttall's *Troximon*, now made by Bentham, appears to have been unavoidable. *Troximon* might, perhaps, have been restricted to one of the two original species, *T. cuspidatum*, which has truly beakless columnar achenia, with only a slight narrowing or indistinct neck under the summit. The broad basilar areola is just that of *Scorzonera*, and the copious persistent pappus is remarkably rigid, some of the longer bristles being flattened and somewhat broadened downwards. This and the whole aspect of the plant suggests a real transition in earlier times between *T. cuspidatum* and the anomalous *Microseris troximoides*, described in a preceding note. But *T. glaucum*, with an evident although short beak to the mature achenium, and *T. aurantiacum*, with a more slender beak, and both with persistent pappus of intermediate character, show such a real gradation to *Macrorhynchus* as to render the reduction of Lessing's genus inevitable. These species, with *T. parviflorum* (*Macro-*

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more persistent and naked." I cannot now verify this statement, which was probably a mistaken one.

+ + Flavifloræ, albo-lanatæ, foliis ad basin caulis confertissimis, pedunculo scapiformi 1–2-cephalo. Achenia ex Nutt. tenuiter 15-striata, coronula obsoleta. — *Malacomeris* Nutt.

11. M. INCANA Torr. & Gray, l. c. *Malacomeris incana* Nutt. — San Diego, on an island in the bay, Nuttall; known only from his imperfect specimens.

M. crepoides Gray, in Stevens, Exped. Pacif. R. R. Expl. is a *Crepis:* vide supra.

rhynchus cynthioides Hook.) and *T. roseum* Nutt. (which seem to be included among the many forms of the polymorphous *T. glaucum*), may constitute a section, *Nothotroximon*, characterized by the comparatively thick and nerved beak. *Macrorhynchus purpureus* Gray, Pl. Fendl., is still ambiguous.

In the section *Macrorhynchus*, characterized by the filiform or capillary and nerveless beak, the perennial N. American species are; —

T. APARGIOIDES Less. (*Macrorhynchus Lessingii* Hook & Arn., *M. humilis* Benth., and *M. Harfordii* Kellogg), of which it is well said that it resembles *Apargia autumnalis.* It has short achenia, with a scarcely longer beak.

T. NUTTALLII, which name is proposed for the *Stylopappus elatus* Nutt., this being by no means a tall species. It is known in fruit by its long achenia (about 4 lines) and comparatively short beak (3 or 4 lines in length).

T. GRANDIFLORUM, the *Stylopappus grandiflorus* Nutt. &c.; with capillary beak several times the length of the short-fusiform or oblong achenium. The typical form, with short and broad foliaceous outer scales to the large head, passes into var. *tenuifolium*, in Oregon (which is doubtless Nuttall's *Stylopappus laciniatus* var. *longifolius*), and apparently into smaller-headed forms, with narrower erect outer scales to the involucre, which, from Nuttall's description, should be his *Stylopappus laciniatus*, but his specimens seen are too young and of a doubtful look. Mature fruit of this form is needed.

T. RETRORSUM (*Macrorhynchus retrorsus* Benth. Pl. Hartw. and *M. angustifolius* Kellogg) is a related but well-marked species, both by the retrorse divisions of the leaves and the truncate apex of the achenium, from which the capillary beak abruptly springs.

Of annual species we have only one, polymorphous as to the achenia, viz.: —

T. CHILENSE, as it must be called; for I think Hooker and (later) Bentham correctly identify our northern species of the sort with *Macrorhynchus Chilensis* of Lessing; and I had long ago made out that Nuttall's *Kymapleura heterophylla* and his *Cryptopleura Californica* must be mere forms of one species. The latter was founded upon an abnormal and hypertrophied state of some of the outer achenia, which I have only once or twice detected; the former upon a more common condition, in which the ribs of many of the achenia develop into wings, which at maturity become either moderately undulated or much contorted, so as to imitate a loose corky coating.

LYGODESMIA Don. Probably Mr. Bentham has rightly referred to this genus the ambiguous little plant named *Prenanthes ? exigua* in Pl. Wright, 2, p. 105. There is another and less incongruous annual or biennial species, with almost as white pappus, to be added. Well marked as the genus is in habit and flowers, it may be divided into nearly as many sections as there are species. The differences are exhibited below.* The genus differs from

STEPHANOMERIA essentially in the pappus only, and both genera have nearly the same geographical range, being characteristic Compositæ of our dry interior region. There are so few characters to hold to in the

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* LYGÓDESMIA Don, Torr. & Gray.

§ 1. Perennes, junciformes; involucro tantum calyculato; pappo molli sordescente. (*Lygodesmia* & *Erythremia* Nutt.)

1. L. JUNCEA Don. The original species. Heads about half the size of those of the next.

2. L. GRANDIFLORA Torr. & Gray. Foliosa; foliis graminoideis seu dianthoideis integerrimis. — To this belongs *L. juncea* of Durand's Utah Memoir, and the var. *dianthopsis* of Eaton in Bot. King, p. 200.

3. L. APHYLLA DC., cum var. TEXANA Torr & Gray. Caulibus totis vel superne aphyllis; foliis dum evolutis sæpe pinnatifido-laciniatis. — *L. juncea* Gray, Pl. Wright, 1, p. 129, no. 417, is an usually branching and more leafy form of this species.

§ 2. Perennes? divaricato-ramosissimæ; ramis spinescentibus; involucri squamis exterioribus gradatim brevioribus; pappo rigidulo sordido. (§ *Pleiacanthus* Nutt.)

4. L. SPINOSA Nutt. Perhaps only biennial; the crown producing a remarkable woolly tuft.

§ 3. Annuæ seu biennes; caulibus paniculatis; involucro tantum calyculato; pappo molli albo vel albido.

5. L. ROSTRATA. Bi-tripedalis, erecta, ramis adscendentibus laxe polycephalis; foliis angustissime linearibus elongatis, ramealibus in bracteas subulatas decrescentibus; pedicellis squamoso-bracteolatis; involucri 8–9-flori squamis propriis totidem angustissime linearibus elongatis; acheniis gracilibus apice subrostratim attenuatis. — *L. juncea* var. *rostrata* Gray, in Proc. Acad. Philad. 1863, p. 69. A good specimen of this, collected at Greeley, Colorado, in sandy soil, by E. L. Greene in 1872, shows the character of the root, akenes, and pappus, which mark it as wholly distinct from *L. juncea*.

6. L. EXIGUA. Spithamæa, a basi divaricato-ramosissima; foliis radicalibus spathulatis runcinato-subpinnatifidis, caulinis ramealibusque sensim in bracteas ovato-subulatas minimas decrescentibus; pedicellis subnudis; capitulis parvis; involucro 4–5-floro e squamis totidem lineari-oblongis cum bracteolis brevissimis 1–2; acheniis breviusculis columnaribus ab apice truncato deorsum parum angustatis inter costas 5 latas scabriusculas angustissime sulcatis. — *Prenanthes? exigua* Gray, Pl. Wright, 2, p. 105. Collected only by C. Wright, in 1852.

Cichoriaceæ that we cannot let go those founded on the nature of the pappus. It seems necessary, however undesirable, to admit a third genus of the sort, founded on a single species, viz.: —

CHÆTADELPHA. — Capitulum 5-florum, liguliflorum. Involucrum cylindricum, e squamis 5 lanceolato-linearibus membranaceis dorso inferne carinatis achenia foventibus, cum exterioribus nonnullis calyculum referentibus. Receptaculum nudum. Ligulæ breves ut videtur roseæ. Achenia linearia, utrinque truncata, sub-5-angulata, leviter pauci-striata, apice lato subrepando. Pappus persistens, sordescens, pentadelphus, nempe e paleolis 5 aristiformibus rigidis nudis, cum setis rigidis utrinque 3–5 pl. m. brevioribus basi accretis. — Herba perennis, facie *Eulygodesmiæ*.

C. WHEELERI. Southern Nevada, on the borders of Arizona, Lieut. G. M. Wheeler, U.S.A. — An incomplete character of this was published by S. Watson in the American Naturalist, May, 1873, among other novelties of the region.